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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/772,023	02/04/2004	Paul Marie Ayoub	TH2229 (US)	5337
23632	7590	11/15/2007	EXAMINER	
SHELL OIL COMPANY			DOUGLAS, JOHN CHRISTOPHER	
P O BOX 2463			ART UNIT	PAPER NUMBER
HOUSTON, TX 772522463			1797	
			MAIL DATE	DELIVERY MODE
			11/15/2007	PAPER

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/772,023
Filing Date: February 04, 2004
Appellant(s): AYOUB ET AL.

MAILED
NOV 15 2007
GROUP 1700

Paula D. Morris
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 7/30/2007 appealing from the Office action mailed 10/12/2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows: 1. "Whether claims 1-43 are obvious..." should be replaced with "Whether claims 1-25 and 38-43 are obvious..."

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,187,981	MARINANGELI	2-2001
6,111,158	MARINANGELI	8-2000

5,523,503

FUNK

6-1996

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-25 and 38-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marinangeli (US 6187981), hereinafter "Marinangeli 1", in view of Marinangeli (US 6111158), hereinafter "Marinangeli 2".

With respect to claim 1, Marinangeli 1 discloses feeding paraffins into an isomerization unit; sending a portion of the isomerization product containing lightly branched paraffins to a dehydrogenation zone; sending a portion of the dehydrogenation product containing paraffins, linear olefins, branched olefins, and aromatics; sending the stream to an alkylation zone; and recycling the unreacted paraffins to the dehydrogenation zone (see Marinangeli 1, column 29, line 34 – column 31, line 31 and column 25, lines 23-38).

Marinangeli 1 does not disclose feeding olefins in the isomerization unit to produce branched olefins from linear olefins, feeding the isomerization product to the alkylation zone to produce alkyl aromatic hydrocarbons comprising a branched alkyl group, separating the alkyl aromatics from the alkylation product stream and separating paraffins and unreacted olefins from the alkylation product stream, feeding the paraffins and unreacted olefins to a dehydrogenation unit to produce olefins and introducing the olefins into the isomerization unit.

However, Marinangeli 2 discloses feeding linear olefins to an isomerization step to produce branched olefins (see Marinangeli 2, column 9, lines 29-31 and 64-66) and feeding the isomerization product to an alkylation zone to produce phenyl-alkanes for detergent range alkylbenzenes including linear, branched, and modified alkylbenzenes and producing unreacted benzenes (see Marinangeli 2, column 5, lines 49-56 and column 10, lines 30-35 and 47-50).

Marinangeli 2 discloses that the isomerization step converts linear olefins to branched olefins and that branched olefins react with aryl compounds to form alkyl compounds (see Marinangeli 2, column 10, lines 19-25).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Marinangeli 1 to include feeding linear olefins to an isomerization step to produce branched olefins and feeding the isomerization product to an alkylation zone to produce phenyl-alkanes for detergent range alkylbenzenes including linear, branched, and modified alkylbenzenes and producing unreacted benzenes in order to convert olefins to alkyl compounds.

Also, it would have been obvious to separate the unreacted aromatics and the unreacted paraffins and olefins from the alkyl aromatic product in order to obtain a pure product.

In addition, according to *In re Burhans*, 154 F.2d 690, the selection of any order of process steps is prima facie obvious in the absence of new or unexpected results (see MPEP 2144.04 IV. C.).

Therefore, it would have been obvious to place the dehydrogenation step after the alkylation step instead of between the isomerization step and the alkylation step.

With respect to claims 2 and 3, Marinangeli 2 discloses where the olefinic feedstock can come from and olefin oligomerization process or a Fischer-Tropsch process (see Marinangeli 2, column 8, lines 22-36).

With respect to claims 4 and 5, Marinangeli 2 discloses where the olefins and paraffins have a number of carbon atoms between 10 and 14 (see Marinangeli 2, column 7, lines 19-25 and 50-54).

With respect to claims 6 and 7, Marinangeli 1 discloses where the isomerization unit is operated at a temperature between about 122 to about 752 degrees C and a pressure of about 1 atm to about 2000psig (see Marinangeli 1, column 10, lines 27-35).

With respect to claims 8 and 10-13, Marinangeli 1 discloses where about 25 % of the olefins are unbranched, branched olefins with two branches comprise less than 30% of the branched olefins, and olefins with one branch comprise more than 70 % of the branched olefins ($.70 \cdot .75 + 2 \cdot .30 \cdot .75 = 1$ branch per olefin) (see Marinangeli 1, column 17, lines 44-51 and column 18, line 64 – column 19, line 13).

With respect to claim 9, Marinangeli 1 discloses where the lightly branched olefins can have branches selected from methyl and ethyl groups (see Marinangeli 1, column 18, lines 49-52).

With respect to claims 14-16, Marinangeli 2 discloses where the branched olefins are monomethyl branched olefins (see Marinangeli 2, column 10, lines 6-8).

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With respect to claims 17 and 18, Marinangeli 2 discloses where the olefins comprising at least one quaternary carbon atom comprise less than 1% of the olefinic feedstock (see Marinangeli 2, column 8, lines 18-21).

With respect to claims 19 and 20, Marinangeli 1 discloses that discloses that only one methyl group branch is preferred (see Marinangeli 1, column 22, lines 12-14). Therefore, it would have been obvious to have the alkylation unit configured to produce greater than 85% monoalkylated aromatics because such products are preferred.

With respect to claims 21 and 23, Marinangeli 2 discloses where the ratio of aryl compounds to monoolefins is between about 1:1 to about 35:1 and that the aryl compound is benzene (see Marinangeli 2, column 10, lines 19-46).

With respect to claim 22, Marinangeli 2 discloses where the alkylation temperature is between about 80 and about 200 degrees C (see Marinangeli 2, column 10, lines 50-53).

With respect to claim 24, Marinangeli 2 discloses where the alkylation unit produces monoalkylbenzenes (see Marinangeli 2, column 10, lines 30-35).

With respect to claim 25, Marinangeli 1 discloses where the alkylation has an internal quaternary phenyl-alkane selectivity of less than 5, where the lightly branched olefins can have branches selected from methyl and ethyl groups, and where about 25 % of the olefins are unbranched, branched olefins with two branches comprise less than 30% of the branched olefins, and olefins with one branch comprise more than 70 % of the branched olefins ($.70 \cdot .75 + 2 \cdot .30 \cdot .75 = 1$ branch per olefin) (see Marinangeli 1,

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column 17, lines 44-51, column 18, lines 49-52 and 64 – column 19, line 13, and column 22, lines 24-31).

With respect to claims 38 and 39, Marinangeli 1 discloses where the dehydrogenation unit is operated at temperatures from about 400 to about 900 degrees C and pressures from about 1 kPa to about 1013 kPa (0-10 atm) (see Marinangeli 1, column 17, lines 6-10).

With respect to claim 40, Marinangeli 2 discloses where the dehydrogenation product stream contains mostly unreacted paraffins and 20% olefins (see Marinangeli 2, column 9, lines 18-28).

With respect to claim 41, Marinangeli 2 discloses passing the dehydrogenation effluent to an isomerization zone (see Marinangeli 2, column 9, lines 11-14 and MPEP 2144.04).

With respect to claim 42, it would have been obvious to one having ordinary skill in the art to recycle the unreacted paraffins back to the dehydrogenation unit in order to obtain more product out of a given amount of feed.

With respect to claim 43, Marinangeli 1 discloses where the alkylbenzenes are subject to sulfonation to prepare alkylbenzene sulfonates and polyalkylbenzenes (see Marinangeli 1, column 23, lines 8-14).

Claims 26-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marinangeli 1 in view of Marinangeli 2 as applied to claim 1 above, and further in view of Funk (US 5523503). Marinangeli 1 in view of Marinangeli 2 discloses everything in claim 1 and Marinangeli 2 discloses that branched olefins are fed to the process (see

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Marinangeli 2, column 8, lines 22-25), but do not disclose adding paraffins or olefins to adjust the ratio of paraffins to olefins.

However, Funk discloses adding either olefins, such as the linear olefin butene or paraffins at a number of points along the flow path of the feed to aid in controlling the paraffin to olefin ratio (see Funk, column 6, lines 51-53, column 7, lines 20-22, column 11, lines 42-45 and claim 13).

Funk discloses that it is preferred to maintain high paraffin to olefin ratios (see Funk, column 11, lines 50-54).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Marinangeli 1 in view of Marinangeli 2 to include adding either olefins or paraffins at a number of points along the flow path of the feed to aid in controlling the paraffin to olefin ratio in order to maintain the preferred paraffin to olefin ratios.

In addition, in the case of *In re Burhans*, 154 F.2d 690 (CCPA 1946), the court held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results. Therefore, the changing of the location of adding olefins or paraffins either before or during isomerization or alkylation or both, would be changing the sequence of performing process steps and thus would be obvious.

(10) Response to Argument

Appellant first argues (see brief, pages 11-12) that there is no specific teaching or motivation to combine the teachings of M2 with the teachings of M1. The recent supreme court decision on obviousness, *KSR International Co. v. Teleflex Inc.* (KSR), 82 USPQ2d 1385 (2007), addressed whether a specific teaching, suggestion, or motivation was needed to combine references. The court in KSR held that a specific teaching is not necessary in order to find obviousness, see 82 USPQ 1385 at 1396, 1397. Therefore, Appellant's argument that there is no specific teaching or motivation to combine, will not lead to nonobviousness.

Appellant next argues (see brief, page 13) that *In re Larson* is not analogous to the present case. The court in *In re Larson* held that a one piece construction was merely a matter of obvious engineering choice over separate component parts that were secured together. The prior art in the present case covers a separate paraffin process in M1 and a separate olefin process in M2. The present invention discloses the paraffin process of M1 and the olefin process of M2 in one integrated process. Therefore, the present invention contains a limitation of integrating prior art processes into a single process. Thus, the issue of integrating prior art components, or processes, into a single component, or process, is similar in both *Larson* and the present invention.

Appellant further argues (see brief, pages 13-15) that *In re Burhans* is not factually similar to the present case. However, Appellant does not fully explain how the differences render the holding of *In re Burhans* not applicable to the present invention. Appellant merely states, in effect, that *In re Burhans* is directed to a process for

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producing flour and that present invention is directed to different reaction steps of olefins and paraffins.

Appellant also argues (see brief, pages 15 and 16) that there is no specific teaching or suggestion in which dehydrogenation is performed after alkylation and before isomerization. However, as mentioned above, the Supreme Court in KSR held that a specific teaching is not necessary in order to find obviousness, see 82 USPQ 1385 at 1396, 1397. Therefore, Appellant's argument that there is no specific teaching or motivation to combine, will not lead to nonobviousness.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.


Respectfully submitted,

John C. Douglas
Examiner
Art Group 1797



JCD

November 8, 2007

Conferees: 
Romulo Delmendo
Appeal Conferee

William Kryrinski

